

# SCIENCE

## *And Technology Program*



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Risk assessment methodologies have been proposed for selenium, based on concentrations found in fish liver and eggs. Our research on fish in the Colorado River Basin indicate that fish selenium concentrations can be increased by ten- to twenty-fold at the same location, and corresponding increases in iron, manganese, copper, and zinc also occur in these fish. A search of the literature indicates that selenium is very interactive with cation metals, often in antagonistic ways, which may reduce toxicity of selenium and/or the metal. I believe that fish which have metabolized a fish hook show these types of body burden increases in metals and selenium. If this is true, then this fact must be taken into consideration when using biomarkers such as selenium body burdens to conduct risk assessments for selenium. This would be particularly true if some portion of the fish population sampled had ten- to twenty-fold increases in metal and selenium concentrations due to metabolism of a fish hook.

The project objective is to test fish, from Colorado River water, metabolizing a fish hook, copper, and silver with selenium concentrations near 2 µg/L to determine the interaction between the metals and selenium. Specifically, the objective is to determine if we can produce fish with similar body burdens of selenium and metals as some outlier fish that we have sampled from the Colorado River. We expect to prove the hypothesis that these outlier fish body burdens are representative of fish metabolizing a fish hook. If metabolizing a fish hook can increase the liver and egg burdens of selenium and metals common to fish hook metallurgy, then this fact must be taken into consideration when using selenium body burden biomarkers to conduct risk assessments at a particular location.

In addition, since selenium hazards to aquatic life tend to impair egg hatchability, we also conducted a hatchability study on fish forced to metabolize metals in Colorado River water with approximately 2 µg/L dissolved selenium. This study is using rainbow trout at the U.S. Fish and Wildlife Service Willow Beach Fish Hatchery, below Hoover Dam on the Colorado River. The rainbow trout from that hatchery have been sampled to get control body burden data prior to muscle tissue inoculation with metals. It is estimated that the fish to be tested would be ready to spawn in November 1999. Preparations are underway to isolate fish in the hatchery and induce metals for metabolism.

Test results from fish at Willow Beach Hatchery indicate that selenium body burdens are very similar to rainbow trout found below Glen Canyon Dam that do not have elevated concentrations. Therefore, these fish are appropriate to use to test the hypothesis that metabolizing fish hooks can significantly increase metal and selenium body burdens, as seen in some fish sampled at various locations in the Colorado River, particularly rainbow trout from the Glen Canyon Dam tailwaters.

Upper Colorado Region  
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